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EXAMINER	
PATEL, NIHIR B	

ART UNIT	PAPER NUMBER
3743	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/786,140	MATTHYS ET AL.	
	Examiner	Art Unit	
	Nihir Patel	3743	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☐ Claim(s) _____ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-27 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 3 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Referring to claim 3, there is insufficient antecedent basis for limitations "the fluid".

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in-
> (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or
> (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

Claim 1 is rejected under 35 U.S.C. 102(e) as being anticipated by Kawaguchi et al. US Patent No. 6,112,806. Referring to claim 1, Kawaguchi discloses a heat exchanger using drag reducing fluid that comprises a surfactant solution 7 (see figure 1 and col. 3 lines 1-5) flowing through the heat exchanger 1 (see figure 1 and col. 2 lines 65-67), which surfactant 7 reduces fluid drag (col. 3 lines 54-59), but not necessarily within the heat exchanger 1 (col. 3 lines 64-67 and col. 4 lines 1-7), the surfactant solution 7 characterized by an optimized recovery time as defined by ability of the surfactant solution 7 to rebuild molecular or micellar-structure after

disruption of the molecular or micellar-structure (col. 4 lines 25-5); and a fluid degradation device 5 (see figure 1 and col. 3 lines 13-17) to create temporary fluid degradation in the heat exchanger 1to break or disrupt the molecular or micellar-structure in the surfactant solution 7 by high local shear stresses so that heat transfer rate of the surfactant solution 7 is increased in the heat exchanger 1 (see figure 1 and col. 3 lines 64-67 and col. 4 lines 1-8) for a predetermined distance or time downstream from the degradation device 5, during which recovery time of the molecular or micellar-structures are being rebuilt, subsequent to which full drag and heat transfer reductions are again achieved (see figure 1 and col. 4 lines 25-35), whereby heat exchanger efficiency is recovered to an original level obtained without surfactant 7 to achieve overall energy savings in the hydronic system (col. 4 lines 14-49).

Referring to claim 2, Kawaguchi discloses a heat exchanger using drag-reducing fluid that comprises providing a surfactant solution 7 (see figure 1 and col. 3 lines 1-5) as a heat exchanging fluid in a heat exchanger 1 (see figure 1 and col. 2 lines 65-67), included within the hydronic system, which surfactant solution 7 reduces fluid drag within hydronic system (col. 3 lines 50-59), the surfactant solution 7 characterized by a predetermined recovery time as defined by ability of the surfactant solution 7 to rebuild molecular or micellar-structures after disruption of the molecular or micellar-structures (col. 4 lines 25-35); and disturbing flow in the heat exchanger 1 to break or disrupt the molecular or micellar-structures in the surfactant solution 7 by high local shear stresses so that heat transfer rate of the surfactant solution is returned to a level approximating heat transfer rate of the heat exchanging fluid without the surfactant 7 added for a predetermined distance downstream from the disturbance during recovery time during which the molecular or micellar-structure are being built (col. 4 lines 15-49).

Referring to claim 3, Kawaguchi discloses a heat exchanger using drag-reducing fluid that comprises providing a degrading device 5 (see figure 1 and col. 3 lines 13-17) which degrades the fluid with minimum pressure drop; creating temporary degradation of a circulating fluid (col. 4 lines 25-35); and conditioning of the drag reducing fluid properties relevant for degradation and recovery.

Referring to claim 4, Kawaguchi discloses a heat exchanger using drag-reducing fluid that comprises a thermal transport fluid and a surfactant additive (see figure 1 and col. 3 lines 1-5) capable of withstanding stress in all pipes and fittings of a circulation system and providing asymptotic drag reduction in straight pipes (col. 3 lines 50-59), and some drag reduction in fittings, whereas in a heat exchanger 1 (see figure 1 and col. 2 lines 65-67) in which the fluid is degraded by a degrading device 5 (see figure 1 and col. 3 lines 13-17), the drag and heat transfer reductions are temporarily substantially eliminated (col. 4 lines 25-35), the fluid remaining substantially degraded during its residence in the heat exchanger 1 after which recovery occurs quickly after the fluid exits from the heat exchanger 1 (col. 4 lines 25-35).

Referring to claim 5, Kawaguchi shows that fluid and surfactant in combination (col. 2 lines 65-67 and col. 3 lines 1-5) are characterized by a drag reduction recovery having a long dead time at substantially reduced drag reduction and a fast recovery to a substantially undegraded drag reduction level (col. 4 lines 25-35).

Referring to claim 6, Kawaguchi discloses a heat exchanger using drag-reducing fluid that comprises a thermal transport fluid and a surfactant additive (see figure 1 and col. 3 lines 1-5) having when added to the thermal transport fluid, a substantial independence of drag reducing

ability, and recovery properties as a function of temperature (see figures 1 and 2 and col. 1 lines 55-60).

Referring to claim 7, Kawaguchi shows that surfactant additive 7 comprises a mixture of surfactants with opposing effects of temperature on drag-reducing ability degradation, and recovery time (col. 1 lines 55-60).

Referring to claim 9, Kawaguchi discloses a heat exchanger using drag-reducing fluid that comprises a first heat exchanging fluid path 3 (see figure 1 and col. 3 lines 5-15); a second heat exchanging fluid paths 4 (see figure 1 and col. 3 lines 5-15), wherein at least one of the first and second heat exchanging fluid paths 3 and 4 further comprises a dedicated degrading device 5 (see figure 1 and col. 3 lines 12-17) disposed therein; and a heat exchanging fluid 7 (see figure 1 and col. 2 lines 65-67 and col. 3 lines 1-10) with a temporarily degradable drag reducing surfactant additive disposed in the corresponding heat exchanging fluid path.

Referring to claim 10, Kawaguchi shows that the dedicated device 5 is used exclusively for degrading a heat exchanging fluid flowing through the heat exchanger 1.

Referring to claim 14, Kawaguchi shows that the dedicated degrading device 5 (see figure 1 and col. 3 lines 12-17) is disposed at or near an inlet the corresponding heat exchanging fluid path.

Referring to claim 17, Kawaguchi discloses a first heat exchanging fluid path (see figure 1 and col. 2 lines 65-67); a second heat exchanging fluid path (see figure 1 and col. 2 lines 65-67), wherein at least a corresponding one of the first and second heat exchanging fluid paths further comprises a conventional hydraulic component (see col. 1 lines 15-25) normally found in a circulation system, which hydraulic component is disposed upstream and in proximity to the

corresponding heat exchanging fluid path; and a heat exchanging fluid with a temporarily degradable drag reducing surfactant additive (see col. 2 lines 65-67 and col. 3 lines 1-10) disposed in the corresponding heat exchanger fluid path.

Referring to claim 18, Kawaguchi discloses a conditioning the drag reducing fluid properties of the drag reducing surfactant (see col. 2 lines 65-67 and col. 3 lines 1-10); providing a degrading device (see figure 1 and col. 3 lines 10-20) which degrades the fluid with minimum pressure drop; creating an initial temporary degradation of a circulating fluid in a flow of fluid in the heat exchanger; and after the fluid is initially degraded, creating additional disturbances in the flow to prevent recovery of the fluid.

Referring to claim 23, Kawaguchi comprises maintaining flow rate of the heat exchanger fluid in the hydronic system, while flow rate of the heat exchanging fluid in the heat exchanger is increased in the heat exchanger through the addition of a secondary pump (see col. 1 lines 15-25) located in parallel with the heat exchanger and connected to the inlet and outlet of the heat exchanger.

Referring to claim 24, Kawaguchi discloses a base component; and a surfactant having drag-reducing, fluid degradation, and fluid recovery properties which are substantially independent of temperature when combined with the base component (see col.2 lines 65-67 and col. 3 lines 1-10).

Referring to claim 25, Kawaguchi discloses a heat exchanger using drag-reducing fluid that comprises providing a flow of the fluid; providing a degrading device in the flow to degrade the drag reducing properties of the fluid (se col. 3 lines 10-20), creating a pressure drop across the degrading device (see figure 1); and measuring the pressure drop as an indicator of resistance

to degradation of the drag reducing properties in the fluid, as well as indicator of the degradation work imposed on the fluid.

Referring to claim 26, Kawaguchi discloses a heat exchanger using drag-reducing fluid that comprises providing a flow of fluid 7 (see figure 1 and col. 2 lines 65-67 and col. 3 lines 1-10); providing a degrading device 5 (see figure 1 col. 3 lines 12-17) in the flow to degrade the drag reducing properties of the fluid, creating a pressure drop across the degrading device 5; and providing a predetermined amount of time after degradation of the drag reducing properties of the fluid to allow recovery of the fluid without additional degradation work being performed, the predetermined amount of time being independent of velocity of the fluid (see figure 1 and col. 4 lines 25-35).

Referring to claim 27, Kawaguchi discloses a heat exchanger using drag-reducing fluid that comprises adding a surfactant to the heat transport fluid 7 (see figure 1 and col. 2 lines 65-67 and col. 3 lines 1-10) to reduce drag in the hydronic system; providing a flow of the heat transport fluid 7 and the surfactant through the heat exchanger 1 (see figure 1 and col. 2 lines 65) at an increased rate over the nominal design limits (see figure 1, col. 3 lines 64-67 and col. 4 lines 1-8); and providing a degrading device 5 (see figure 1 col. 3 lines 12-17) in the flow in the heat exchanger 1 to degrade the drag reducing properties of the surfactant in order to increase the heat transfer rate of the heat transport fluid in the heat exchanger.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 11, 12, 13, 15, 19, 20, 21, and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over combined teachings of Kawaguchi et al. US Patent No. 6,112,806 and Brown US Patent No. 4,702,312.

Referring to claim 11, Kawaguchi discloses the applicant's invention as claimed with the exception of providing a degrading device that imposes a flow disturbance or shear stress uniformly across a across section of the corresponding heat exchanging fluid path in which the dedicated degrading device is disposed.

Brown discloses a thin rod packing for heat exchangers that does provide a degrading device that imposes a flow disturbance or shear stress uniformly across a across section of the corresponding heat exchanging fluid path in which the dedicated degrading device is disposed (see figure 1a). Therefore it would be obvious to modify Kawaguchi's invention by providing a degrading device that imposes a flow disturbance or shear stress uniformly across a across section of the corresponding heat exchanging fluid path in which the dedicated degrading device is disposed in order to provide better heat transfer.

Referring to claim 12, Kawaguchi discloses the applicant's invention as claimed with the exception of providing a degrading device that exposes every surfactant particle flowing in the corresponding heat exchanging fluid path to at least a supercritical stress.

Brown discloses a thin rod packing for heat exchangers that does provide a degrading device that exposes every surfactant particle flowing in the corresponding heat exchanging fluid path to at least a supercritical stress (see figure 1a). Therefore it would be obvious to modify Kawaguchi's invention by providing a degrading device that exposes every surfactant particle flowing in the corresponding heat exchanging fluid path to at least a supercritical stress in order to provide better heat transfer.

Referring to claim 13, Kawaguchi discloses the applicant's invention as claimed with the exception of providing a degrading device that is not significantly higher than the supercritical stress so that the flow energy needed for degradation is minimized.

Brown discloses a thin rod packing for heat exchangers that does provide a degrading device that is not significantly higher than the supercritical stress so that the flow energy needed for degradation is minimized (see figure 1a). Therefore it would be obvious to modify Kawaguchi's invention by providing a degrading device that is not significantly higher than the supercritical stress so that the flow energy needed for degradation is minimized in order to provide a better heat transfer.

Referring to claim 15, Kawaguchi discloses the applicant's invention as claimed with the exception of providing a degrading device that comprises a wire mesh disposed across the corresponding heat exchanging fluid path.

Brown discloses a thin rod packing for heat exchangers that does provide a degrading device that comprises a wire mesh disposed across the corresponding heat exchanging fluid path (see figure 1a). Therefore it would be obvious to modify Kawaguchi's invention by providing a

degrading device that comprises a wire mesh disposed across the corresponding heat exchanging fluid path in order to provide better heat transfer.

Referring to claim 16, Kawaguchi discloses the applicant's invention as claimed with the exception of providing a degrading device that comprises a wire mesh that also functions as a filter.

Brown discloses a thin rod packing for heat exchangers that does provide a degrading device that comprises a wire mesh that also functions as a filter (see figure 1a). Therefore it would be obvious to modify Kawaguchi's invention by providing a degrading device that comprises a wire mesh that also functions as a filter in order to provide better heat transfer.

Referring to claim 19, Kawaguchi discloses the applicant's invention as claimed with the exception of providing a smaller pressure drop than the one used for the initial degradation upstream of heat exchanger is used to create the smaller disturbance.

Brown discloses a thin rod packing for heat exchangers that does provide a smaller pressure drop than the one used for the initial degradation upstream of heat exchanger is used to create the smaller disturbance. Therefore it would be obvious to modify Kawaguchi's invention by providing a smaller pressure drop than the one used for the initial degradation upstream of heat exchanger is used to create the smaller disturbance in order to transfer heat better.

Referring to claims 21 and 22, Kawaguch discloses the applicant's invention as claimed with the exception of providing a drag reducing fluid properties of the drag reducing surfactant fluid by pipe stress to use shear stress generated by the heat exchanging fluid paths of the heat exchanger to degrade the fluid.

Brown discloses a thin rod packing for heat exchangers that does provide a drag reducing fluid properties of the drag reducing surfactant fluid by pipe stress to use shear stress generated by the heat exchanging fluid paths of the heat exchanger to degrade the fluid. Therefore it would be obvious to modify Kawaguchi's invention by providing a drag reducing fluid properties of the drag reducing surfactant fluid by pipe stress to use shear stress generated by the heat exchanging fluid paths of the heat exchanger to degrade the fluid in order to provide a better heat transfer.

Referring to claim 8, the applicant claims that the mixture of surfactants comprises a cationic surfactant and a nonionic surfactant in which opposing effects of the cationic surfactant and nonionic surfactant substantially cancel each other to provide a substantially temperature independent surfactant additive. The type of surfactant used in the invention is simply a matter of design choice as stated by the applicant in the specifications (see page 6 lines 9-12).

Conclusion

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communication from the examiner should be directed to Nihir Patel whose telephone number is (703) 306-3463. The examiner can normally be reached on Monday-Friday from 7:30 am to 4:30 pm. If attempts to reach the examiner by telephone are unsuccessful the examiner supervisor Henry Bennett can be reached at (703) 308-0101.

Henry Bennett
Supervisory Patent Examiner
Group 3700

NP
January 28, 2003